Journal of the Society of Arts.

FRIDAY, OCTOBER 30, 1868.

Announcements by the Council.

EXAMINATIONS, 1869.

The Programme of Examinations for 1869 is now published, and may be had *gratis* on application to the Secretary of the Society of Arts.

PRIZES.

The Council, at the suggestion of the Food Committee, offer the following prizes for Improved Railway Meat Vans, Milk Vans, and Milk Cans :—

1. For an improved method of conveying meat by rail, the Society's *Silver Medal* and £10.

The object in view is to reduce to a minimum the deterioration which meat now suffers in its transit by rail. The principal evils to be avoided are—excessive changes of temperature, and injuries by pressure, by handling, exposure to dust, insects, &c. This prize may be awarded for an improved railway meat van or for a travelling meat larder suitable for railways.

Model on a scale of half an inch to a foot to be sent in.

2. For an improved method of conveying milk cans by rail, the Society's *Silver Medal* and £10.

The object in view is to reduce to a minimum the deterioration which milk now suffers in its transit by rail in the ordinary open trucks. The principal evils to be avoided are—the heating and shaking of the milk cans.

Model of an improved railway milk van, on a scale of half an inch to the foot, to be sent in.

3. For an improved railway milk can, the Society's *Silver Medal* and £10.

The object in view is to reduce to a minimum the deterioration which milk now suffers in its transit by rail in the ordinary milk cans, or "churns." The principal evils to be avoided are—the heating of the milk, and all motion within the can which may cause the buttery particles to separate.

A specimen of the improved railway milk-can to be sent in.

The models and specimens for competition must be forwarded to the Secretary of the Society of Arts before the 1st February, 1869.

SUBSCRIPTIONS.

The Michaelmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of Institutions.

MARLBOROUGH READING AND MUTUAL IMPROVEMENT SOCIETY.—In the twenty-fourth annual report of the society, to Michaelmas, 1868, the committee refer with pleasure to the fact that the funds of the society have enabled them, during the past year, to make the considerable addition of eighty volumes to the library, at a cost of £18 18s. With respect to the concert and lecture engagements of the past year, the committee would particularlarly refer to the concert by professional artistes, which Mr. Bambridge (the organist of Marlborough College) kindly conducted, on behalf of the society, in the large room in the town-hall, in November last, and which was attended by 500 persons. To this concert the members of the society were admitted at half-price, and a considerable number were present. The committee have already made some musical and other arrangements for the approaching season. The balance-sheet shows that the expenditure has amounted to £168 16s., and that there is a balance in hand of £20 6s. 5d.

EXAMINATION PAPERS, 1868.

(*Concluded from page* 804.)

The following are the Examination Papers set in the various subjects at the Final Examination held in April last:—

GEOMETRICAL DRAWING.

THREE HOURS ALLOWED.

The constructions must be accurate, and show clearly, by plain and dotted lines, with appropriate letters of reference, the principles on which they are based. No construction by trial nor calculation will be admitted. They may be put in ink or left in pencil, at the discretion of the candidate, provided they are distinct.

No deviation from the conditions of the questions can be admitted; and since no candidate must answer more than two questions from any one section, he is advised not to attempt more than the time will admit of his completing, since little or no credit will be given for incomplete or inaccurate constructions.

Observation.—Whatever the number of questions the candidate constructs, one-half must be from the Solid Geometry.

I.

Construct a six-sided polygon A B C....F from the following conditions:—

Sides.		Angles.	
A B	= 1·5 inches	A B C	= 100°
B C	= 2 ,,	B C D	= 110°
C D	= 2·25 ,,	C D E	= 120°
D E	= 2·5 ,,	D E F	= 130°
E F	= 3 ,,		

Write down the length of the side F A, and the angles E F A, F A B.

II.

A line, A B, 3·5 inches long, is to be divided in the points C D, according to the following conditions:—

1. A C : C D : D B :: 1·75 : 2·25 : 3.
2. A C : C B :: A B : B D (The point D will be in A B produced).
3. A C · B D = A D · B C (A C to be 1·25 inches and D in A B produced).

III.

Construct a triangle from one of the following conditions:—

1. Its area 6 square inches; its sides as 2 : 2·5 : 3.
2. Its area 6 square inches; its sides equal.
3. Isosceles, its base 2 inches, and the angles at the base double of that at the vertex.

IV.

Draw a triangle, its sides being 2·5; 3; 3·25 inches.

1. Construct an equilateral triangle equal to it in area.
2. Construct a square of twice its area.
3. Construct a triangle *similar* to it of twice its area.

V.

1. A point P is 2 inches from the centre of a circle of 1·25 inches radius; draw a line through P, cutting the circumference C D, so that P C · P D = C D^2

2. Draw two other circles to touch the first and also each other, so that the *areas* of the three may be as 1 : 2 : 3.

3. Circumscribe the first circle by a triangle, having its sides as 2 : 2·5 : 3, and having one of its angles at P.

SOLID GEOMETRY.

(These constructions to be made explicit by a consistent notation, and by *indices* where required.)

VI.

1. Represent, by means of any two lines lying in it, a *plane* inclined to the paper at 50°.

2. Represent a plane inclined at 50° to the paper, and another perpendicular to the first but inclined at 70°.

3. Represent three planes, each perpendicular to the other two, the intersection of two of them being inclined at 30°.

VII.

A triangular pyramid has its edges 2″·25; 2″·5; 3″; 3″·25; 3″·5; 3″·75;

1. Draw its *plan* and *elevation* when it is standing on any of its four faces on the paper.

2. Draw its plan and elevation when its longest edge is vertical.

3. Determine the form of the section of this solid made by a plane bisecting any two of its edges, and passing through its centre of gravity.

VIII.

An octagon of 1 inch side is the base of an *oblique* prism, the edges of which being inclined at 70° to that base, are 4 inches long, and parallel to a vertical plane passing through a diameter of the base.

1. Show the plan of this solid when standing on its base and an elevation on a plane not parallel to the edges.

2. This prism is bisected by a plane perpendicular to the edges; draw the real form of the section.

3. Draw the plan of one of the frusta when standing on the plane of the section.

IX.

An *oblique* pyramid has an octagon of 1 inch side for its base; its axis, which is 4 inches long and inclined to the base at 70°, lies in a vertical plane, passing through a diameter of the base.

1. Show the plan of this solid when standing on its base, and an elevation on a plane *not* parallel to the axis.

2. Draw the plan and an elevation when the shortest edge is either vertical or horizontal.

3. Determine the plan of the frustum cut off by a plane perpendicular to the axis, and passing through the centre of gravity of the solid when that frustum stands in the plane of the section.

X.

A right cone and a cylinder, each 4 inches high, and their bases 3 inches in diameter, and a sphere 3 inches in diameter; to be represented by plan and elevation.

1. When the cone lying on its side on the paper, the sphere also lying on the paper, touches the cone in a point at $\frac{1}{3}$ of the distance from the vertex to the circumference of the base.

2. When the cylinder standing on its base touches the cone in a point with the same condition.

3. When the cylinder lying on its side, the cone standing on its base touches the cylinder, and the sphere touches both.

XI.

Determine the shadow of one of the above solids, as cast by a luminous point 6 inches above the paper, when

1. Perpendicularly over the vertex of the cone, when lying on its side on the paper.

2. When 4 inches from the surface of the sphere, lying on the paper.

3. When in a vertical plane touching the side of the cylinder, lying on its side on the paper.

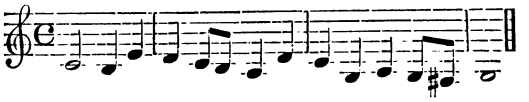
(In each case the line or lines on the curved surfaces, which separates the part in light from the part in shadow, to be shown).

THEORY OF MUSIC.

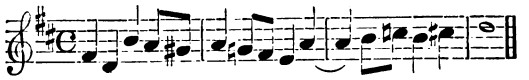
THREE HOURS ALLOWED.

RUDIMENTS OF MUSICAL GRAMMAR.

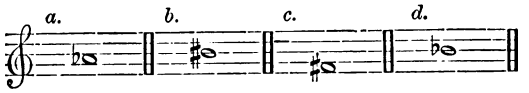
1. Write the following, *at the same pitch*, on the bass stave:—



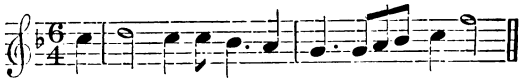
2. Transpose the following into *Si b* (B *b*):—



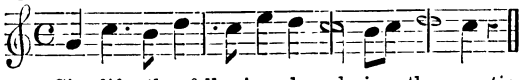
3. Add a minor second to *a*, a major third to *b*, a perfect fourth to *c*, and an imperfect fifth to *d*.



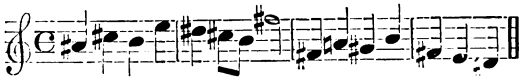
4. Write the following in $\frac{6}{8}$ time:—



5. Write the following in a more modern and intelligible form:—



6. Simplify the following, by placing the *essentia* sharps in the signature:—

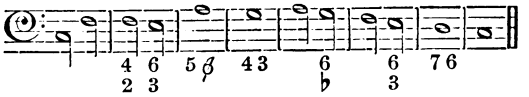


7. Write the signatures of *Mi b* (E *b*), *Fa* (F), *Sol* (G), and *La b* (A *b*), major; and of *Si* (B), *Do* (C), *Re* (D), and *Mi* (E), minor.

8. Write from memory the psalm-tune (melody only) *Bedford*, or *London New*, or any other.

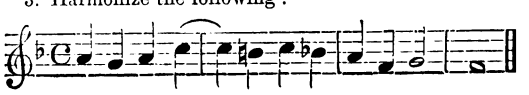
HARMONY.

1. Add three parts to the following:—

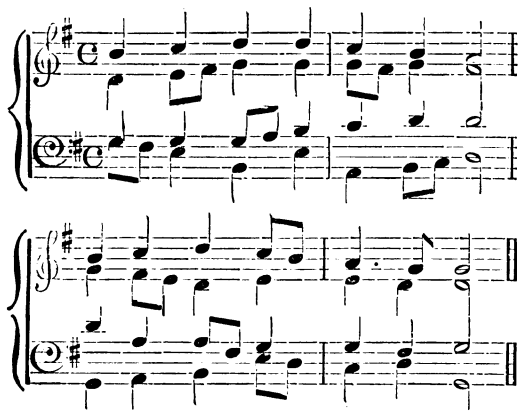


2. Write discords of the dominant seventh, and their resolutions in the keys of *Do* (C), *Re* (D), *Mi b* (E *b*), and *Fa* (F).

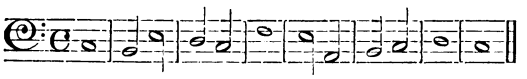
3. Harmonize the following:—



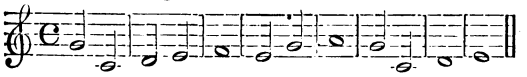
4. Put the following into score for soprano, alto, tenor and bass:—



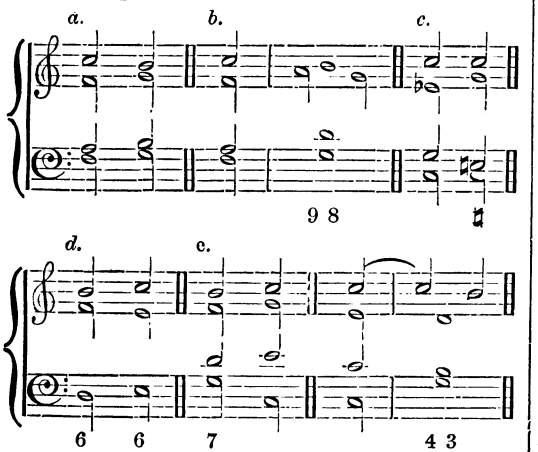
5. Add a part or parts, in any kind of counterpoint, *above* the following:—



6. Add a part or parts, in any kind of counterpoint, *below* the following:—



7. Correct the errors in the following without altering the extreme parts—treble and bass:—



8. Place the following names of composers in chronological order, under the following headings—the names of the countries of one or other of which they are natives—*Italy*, *Germany*, *England*, *France*:— Purcell, Mozart, Weber, Tallis, Rameau, Callcott, Mendelssohn, Rossini, J. Sebastian Bach, Auber, Blow, Palestrina, Morley, Bishop, Marenzio, Haydn, Webbe, Handel, Lully, Arne, Spohr, Carissimi, Orlando Gibbons, and Beethoven.

ON THE EDUCATION OF THE MERCHANT.*

By Professor Leone Levi, F.S.A., F.S.S., Doctor of Economic Science, &c.

Ever since its foundation, forty years ago, it has been the aim of this college to supply, to the utmost of its power, the best practical education, to cope with the advance of science, and to adapt itself to the varying requirements of the times. Depending, as it does, altogether on voluntary support, and having no trust to fulfil, and no will of long departed founder to obey, the one object which the institution, as a whole, and each professor and lecturer individually, have at heart, is to extend their usefulness, and to render the college, really and practically, worthy of the place which it occupies in the centre of this great metropolis of commerce. We feel that we must not stand still whilst all around is moving, and we are ready and prepared to admit of any improvement which the wisdom of the country may suggest, or any change which altered circumstances may dictate, be it in the subject matter of education, or in the manner of teaching, so that by any means we may advance, and not be found wanting.

The effort now made to promote what is termed technical education is not new to this college. One of its principal functions has been to diffuse the knowledge of those sciences which are intimately associated with the industrial progress of the country. We have a whole department for the Applied Sciences. Engineering and Architecture form the subjects of special studies. The Theological and Medical departments are essentially technical institutes, and pre-eminently so is the Evening Class department. It would be difficult and otherwise inconvenient to establish distinct professional colleges for the different occupations of life, since the elementary branches of education are wanted in common for all occupations and professions, and certain branches which are of absolute necessity to some, are often learnt with a view to ornament and pleasure by others. Nor is it well to accustom our youth to class distinctions, however unavoidable in after-life. Sufficient if every one anxious to enter any occupation or profession has within his reach the means of acquiring the knowledge of the sciences necessary for the same.

Assuming, for instance, that the largest number of those who enter these evening classes have already made up their minds as to the avocation they intend to follow, it is comparatively easy for them to select such classes as are likely to prove the most useful, and in this manner each may derive from them the benefit of a technical institute. A first condition for a successful technical education for any profession, is, doubtless, a mind already prepared by a sound general education. It must be remembered that technical education begins where a good elementary, and sometimes even a secondary, education ends. The general education which a youth obtains at school fits the mind for the higher and more appropriate studies, just as the breaking of the fallow ground, the tilling and ploughing, prepare the land for any seed which the husbandman may intend to sow. And what is this general education which the student for the mercantile profession should absolutely possess? First and foremost is a sound knowledge of English, the mother-tongue. In the foreign schools the national language always stands first, and nothing can be more important than the ability to speak and write in a clear and precise manner, and in a style at once correct and elegant. A prolix and fanciful phraseology ill accords with the pressing demands of commerce on the time and energies of the merchant. Together with the knowledge of the native language, that of one or more foreign languages is of the greatest utility. There are but few offices of merchants or brokers in the city of London, or in any other mart of merchandise, where such knowledge does not come into actual practice, whether in the correspondence or in personal intercourse with natives of other countries. The French language has become indispensable, by the immense extension of our trade with France, and the increasing intercourse we have with her people. German is the tongue of the great corn-growing countries in the north of Europe. The Italian language is of use not only for Italy, but for Greece and the Levant

* Introductory lecture delivered at King's College, London, on the 15th October, 1868.

The study of foreign languages is of much practical value, more especially as an intellectual exercise, and as the means for unlocking the gate to a large field of knowledge. As for the classics, the study of Latin, at least, is recommended, not only on account of the beauty of the language, but because it has entered so largely into the English that the meaning of a considerable proportion of our words is first discovered to us on learning Latin. Beyond this, arithmetic is of paramount necessity, and mathematics is needed to give completeness to the knowledge of arithmetic. These, and other branches of elementary education, the students of these evening classes are supposed to possess, nor is it needful to inculcate the advantage of acquiring them in as perfect a manner as possible to such a class as I have the honour to address.

We must, however, pass to the higher studies required for the mercantile profession; and, to determine these, let us for a moment glance at some of the operations of trade. In their simplest form, as they are carried on by the retail dealers in shops and warehouses, they appear comparatively simple, and little more than a practical application of the principle of buying in the cheapest market and selling in the dearest, but as you rise from the retail to the wholesale, from the home to the foreign merchant, how vast and complicated become his operations, how extensive the correspondence, how manifold the duties, how arduous and responsible the management. The merchant needs to be acquainted with the productions of different countries, and with the economics of such productions. He should have regard to the political vicissitudes of states, and balance the probabilities of war and peace, of quietness or revolution. The stability of finances, and the state of public credit, have a direct influence upon his trading, and to them he must give his attention. The law of supply and demand, and its effects at any given time on prices and values; the various, and often perplexing, phenomena exhibited by the operations of monetary laws; the state of the foreign exchanges, and the manifold contingencies connected with the transport of merchandise, how do they task the mind, and call forth the greatest energies! And when we come to the practical work of a merchant's office, see how well-defined are the duties of each officer, and how systematic is the work of every one of them from the highest to the lowest. Can we fail to perceive that much knowledge is required for the satisfactory management of such operations, and that many sciences should be studied ere we can reason safely on the working of so many influences, and unravel and master the difficulties and intricacies of mercantile enterprise?

I am not prepared to say that the study of science is the sole condition to mercantile success. Full well do I know how much a natural shrewdness and sagacity, a careful and steady application, and other moral, rather than intellectual, qualities benefit a trader; and do we not daily see men of no education amassing princely fortunes? Yet of this we may be certain, that the whole doctrine of commerce is based upon inductive reasoning. In most cases, it is not theory or imagination. Facts and figures are there — he who draws the most correct inferences reaps the largest profit. A great revolution has been effected in late years in the method and basis of mercantile transactions. When all information was monopolised by a few, when all notions of quantities were extravagantly distant from truth, and when events even the most patent could be concealed with perfect impunity, mercantile adventures were founded on chance, and secresy formed the chief stock of merchandise. Now, however, both commerce and banking are approaching towards the perfection of fixed sciences, and as such they must be studied. Like every other science, commercial and monetary sciences have ideas and principles peculiar to themselves. Let us investigate them as carefully and thoroughly as we do other sciences, and we shall soon be able to see light amidst all the ambiguity, difference of opinion, and contradictory views often enunciated on the different subjects connected with commerce and banking.

Having already dwelt on the importance of the study of languages and mathematics, studies which must be followed up with still greater care and completeness in connection with technical instruction, let me call your attention to the study of statistics as a science of primary importance in every branch of commerce. Statistics, as is well-known, are the science of procuring, arranging, and publishing facts calculated to illustrate the condition and prospects of society. In relation to trade, they supply facts connected with the quantities, existing or available, of different articles of produce or manufactures the prices which rule or have ruled in different countries, the operations of banking and monetary institutions, the rates of freight, and a vast variety of miscellaneous information. Mechanically, the merchant and banker are constantly manufacturing statistics. Let it be remembered, however, that whilst nothing seems easier than forming huge columns of numbers, nothing is more difficult than an exact classification of facts. Statistics always labour under the imputation from public men of being very unsafe and deceptive. The best means of avoiding this charge, and of relieving the science from this source of failure, is to bestow the greatest care upon each fact collected in its individuality of source and bearing. The first duty of the statist is to guard against all conjectures in the methodical classification of facts, to be sincere, impartial, and scrupulous in arranging them, and to be careful in laying down only what he knows. In connection with algebra and mathematics, statistics are the groundwork of the whole business of life, fire, and marine insurance. The great extension of life insurance, especially, has introduced the new profession of the actuary, and in his hands, the tables of mortality have acquired a novel and highly practical value.

Naturally connected with arithmetic is book-keeping, or accountancy, and we have here a class in the evening, where the student is taught to journalize, post, and balance accounts, to make trial balances, and to close a set of books. And for this purpose the supposed transactions of a mercantile house, extending over a period of three months, are given him to copy, and make the necessary calculations preparatory to the entry of them in a proper manner in the different books. Doubts have been raised as to the expediency of teaching book-keeping, since different systems are used in trade, and what is learnt may afterwards prove useless, but we cannot doubt the necessity of extending the knowledge of commercial accountancy. Is it not the fact that a multitude of bankruptcies are occasioned by the defective state in which the accounts are kept? In Edinburgh there has been for a long time instituted a Society of Accountants, the members of which are required to know the more advanced rules of arithmetic, algebra, the principles upon which annuity and life assurance transactions proceed, how logarithmic tables are framed and used, book-keeping of every description, the method of compiling and framing statements in investigation, the bankruptcy law, and the law of partnership. Let it be the aim of every merchant to possess the requirements of professional accountants, and the interests of trade and morals will gain enormously.

Foremost, however, amongst the technical studies of the merchant is a knowledge of commerce itself, including the principles which govern international trade, money, prices, wages, profits, the foreign exchanges, banking and commercial crises. How perplexed we often are at the phenomena presented by the sudden influx or efflux of capital, at the extreme height and the degraded value of money. How many problems have been suggested in connection with the changes in the foreign exchanges, and how strange does the attitude of the Bank of England often appear, especially in relation to that much vilified piece of legislation, the Bank

Charter Act of 1844. The only way to obtain proper light on such subjects is to study the principles of commercial science. And such principles may be studied with great interest in the history of our commercial and banking policy. Many a lesson may be drawn from the working of acts and measures which, having been sought after with eager expectation, left afterwards nought but bitter disappointment. Nor is it less important to learn the details relating to the organization of the principal industries, and the facts and information respecting the different articles of trade, such as prices and quantities, processes of manufacture, sources of the raw materials, and more especially the economics of labour now so much affected by trade unions. Take tea and sugar among the articles of import, and cotton and silk among our manufactures. How valuable to know the countries whence they are received and whither they are sent, the bearing of legislation on consumption, and other particulars peculiar to each industry. How useful also would it be to familiarize the student with the appearance of such articles by means of a well-assorted museum of samples, which might be easily founded in this college.

On the subject of commerce there are many works which may be studied with advantage. McCulloch has written largely upon it; his dictionary is a mine of commercial information, and his essays on the subject are very full and reliable. Mr. Laing's work on the "Theory of Business" is terse, correct in the main, and well conceived. It is an able effort to reduce into scientific order the daily practice of business, and to trace relation and connection between facts and circumstances apparently isolated and disconnected. Upon the origin and history of commerce Anderson's "History" and Macpherson's "Annals" are standard works, though now very old as to date. But to see the character and extent of the commerce of this and other countries now, you must study our official publications, such as the Annual Statement of Trade and Navigation of the United Kingdom, published by the Board of Trade; the annual reports of Her Majesty's Board of Customs and Commissioners of Inland Revenue; the statistical tables relating to foreign countries; the reports of Her Majesty's secretaries of embassy and legation on the manufacture and commerce of the countries in which they reside; the commercial reports of Her Majesty's consuls; and more especially the Statistical Abstracts of the United Kingdom, of India and the British colonies, which contain the cream of the information given in hundreds of volumes. To say nothing of smaller works on the commerce of special countries, and on certain articles of trade.

Political economy, which investigates the nature of wealth, and the laws of its production and distribution, is pre-eminently useful for commerce, especially in so far as it discovers the economical laws which govern production and international trade. The School Inquiry Commission strongly recommended such study, on the ground that it bears directly on the conduct of life, and may be made exceedingly interesting; that it supplies excellent examples of reasoning; and that in the hands of a skilful teacher it can be brought completely within the comprehension of all. Doubtless, if we take John Stuart Mill's, or any other treatise on political economy, we shall find many chapters which have only a distant relation to commerce. But few can rise from the study of Adam Smith's "Wealth of Nations," and the other works which have emanated from Mill, Senior, Say, Chevalier, and other economists, without being pervaded by a strong desire to know more of a science which, better than many others, reveals the vast resources of nature, and the secret of her working.

Physical geography is another branch of knowledge of practical value to the merchant. To know the chief characteristics, and the different productions of the soil of each country, is of the utmost importance for purposes of commerce. New scenes are constantly opened to mercantile adventures. Countries, once closed to European contact, gradually enter into the bonds of civilized states. China and Japan, the oldest countries on earth, except, perhaps, Egypt, are now open to British trade. And how little we know as yet of their boundless capacities. It has been well observed, the bounties of nature are inexhaustible. Nature has yet many wonders in her storehouses awaiting the discoveries of man, and fitted for the rapid advancement of civilization, and for the diffusion of numerous comforts. Other sciences become necessary to merchants and manufacturers in special localities. Geology is of primary necessity to all connected with mining enterprise, at home and abroad. Millions are often wasted through ignorance, from trying to get metals from barren rocks, or from not seeking them where they may best be found. And chemistry is of considerable use in manufacture.

But of still greater utility to merchants and manufacturers of all classes, is a knowledge of the laws which regulate the different relations of trade, and the various instruments of commerce. Some acquaintance with commercial law, and especially with the law of contracts, partnerships, agency, bills of exchange, shipping, and insurance, is indeed indispensable to a trader. Surely it must be useful to learn how to apply the scientific principles of law to such transactions as the purchase and sale of goods, the drawing, accepting, or endorsing of a bill of exchange, or the preparation of a bill of lading or charter-party. We must remember also that, commerce being essentially international, the laws of foreign countries on these subjects are equally important as our own. Therefore a knowledge of the code of commerce of the country with which you are trading is of the utmost value, and may save you many a blunder, and protect you against many a loss. And so it is with international law, which has reference to the rights of neutrals, the rights of belligerents, and the rights and duties of consuls and ambassadors. Let a war suddenly break out in any part of the globe, and British property and British subjects are certain to be more or less affected. What could be more important for a merchant than to know how he should protect himself in such emergencies, and what are the requirements of that law of nations which acts so imperiously even in the farthest quarters of the globe. Works on commercial and international law are very numerous. Besides my own "Manual of Mercantile Law" and my larger work entitled "International Commercial Law," you will find Smith's "Mercantile Law" a standard work on the mercantile laws of England, and many treatises on special branches of law, such as Chitty's compendious books on contracts, bills of exchange, &c., Lindley on partnerships, Byles on bills, &c. On international law, Vattel, Wheaton and Phillimore are the most authoritative writers, and their works may be read with considerable interest.

Many other branches of knowledge are of great advantage, if not an absolute necessity, to the merchant. The customs laws of other countries materially affect our foreign trade. How can we calculate the cost of merchandise at this or that other port, and the value of the sale-price of any article, unless we know the tariffs of other countries? As yet the weights, measures, and coins of different states are widely different from our own and from one another. A knowledge of these, and more especially of the metric system, which is being introduced in all countries, and will probably ere long be made compulsory in this country, is also important. Very frequently do we find our minds seriously tasked when we have to calculate the cost-price of wheat and other articles at quotations so strange, both as respect quantities and currencies, to say nothing of the difficulties introduced by the relation of gold to paper-currency in such countries as the United States and Italy.

I have far from exhausted the catalogue of the branches of knowledge necessary for the safe manage-

ment of trade, but I trust it may suffice as a guide to such as wish to assume a position of influence in the difficult career of commerce, and to such especially as disdain wandering about on a pathless ocean, without a compass, depending on the winds and tides to carry them into port. It is said that a youth, placed early in a mercantile office, will learn all that is required without much study. We may fancy the mechanic, artisan, and manufacturer to be insensibly disciplined to perform works by the hands with wonderful dexterity; but I doubt whether the clear head, the variety of accomplishments, and the real judgment, which are necessary for a merchant, can be acquired by merely inspecting what others are doing. Let the transactions of a counting-house be ever so important and diversified; let them be judiciously conducted, and methodically adjusted, according to the nicest art of mercantile skill—yet, if a youth is not furnished with the requisite knowledge to enable him to obtain the best advantage from what he sees transacted, he will not be much the wiser for it. All that is transacted will seem to him confused and perplexing, and he may remain utterly unprepared to take a wide and firm grasp of all the various operations which are necessary in the prosecution of business. A combination of study and practice is the best preparation for the mercantile career; and this is now within your reach by the institution of these evening classes, where you can get in the evening a philosophical explanation of your work in the day.

As a first condition of success, let me entreat you not to form too low an idea of the accomplishments necessary for the mercantile profession. It is not well to imagine that you may fill your place and carry out your work without any great effort of mind and intelligence. Let it rather be your ambition to enter into your profession well harnessed for your duties, and determined to master all the details, and to learn in all cases the reason of the thing. And do not think ill of commerce. Form no low conception of that calling. Time was when commerce was deemed a craft, the child of chance, or the fruit of sordid cupidity. And there may have been some, like the Romans of old, who have esteemed its functions degrading to the mind, and calculated to stifle every noble emotion. Dismiss any such idea. Think how much does the world owe to commerce. How it has softened the character of society. How far and wide it has introduced civilisation. How much the state of warfare, in which society was constantly thrown, has been altered through its peaceful influence. What riches it has amassed! How much human comforts have been thereby increased; and, withal, what an amount of happiness it has procured. Truly, commerce has its trophies nobler far than military prowess. And is commerce the pursuit of only the unlettered and ignoble? No. Where prejudice and pride once disdained its touch and alliance, now the coronet encircles the head of the successful merchant and banker. Their voice is heard in the councils of the Sovereign, and the wants of commerce are carefully weighed in the balance of public good.

Those who have examined the question of technical education in all its bearings, have come to the conclusion that the defects by which this country suffers, in the great competition with foreign countries, are far more due to the ignorance of those who direct the works than to the imperperfect technical education, want of skill, or incapacity in those who execute them. May it not be the same as regards merchants and clerks? Is there not reason to fear that in the eagerness for wealth many suddenly start as merchants who are altogether strangers to that calling, and many who have had no previous training to prepare them for its duties? Let us remember that in this, as in all other respects, education is power; that skill and inventiveness add immensely to the resources of the merchant, and that the economy of time and of agents obtained through increased efficiency, act as so much addition to the mercantile capital. It is the same in commerce as in manufacture. Mr. Chance, the eminent glass manufacturer in Birmingham, in his evidence before the Committee of the House of Commons on scientific instruction, said that the head of a great manufacturing establishment cannot be too highly educated. He thought it a mistake to look on his pursuit otherwise than having a high professional character; that it is a greater error to suppose that the conduct of large works does not require a variety of the qualities of mind which are wanted for certain professional pursuits. And he advocated that every one who is to be at the head of a large manufacturing establishment should have a university education.

The Committee on Technical Education, appointed by the Society of Arts, Manufactures, and Commerce, have recently put forth a scheme for the education of the merchant, suggesting that courses of lectures on the subjects already indicated be provided, and that yearly examinations be held, presided over, if not conducted by, merchants of the first-class, in the same manner as the leading solicitors and the members of the medical profession now conduct the examinations of the medical and law institutions. We offer here, at King's College, precisely the same scheme. We give the required instruction. We hold yearly examinations, and have no objection to the presence of the best and most influential of our London merchants. Let a student enrol himself in the classes which are necessary for trade as indicated in the syllabus, and if he succeeds in obtaining upwards of 300 marks at his examination, we shall grant him a diploma of fitness for the mercantile profession. What we require is a proper encouragement for the students to pursue such studies. The Committee of the Society of Arts, of which I was a member, stated in their report that it is incumbent on all those who really believe in scientific teaching to prove their faith by giving a practical value to the certificates obtained by students. The best mode of inducing the rising students to follow this methodical training, is doubtless by showing them that the few who take that course do find employment more readily than those who do not. And the employers of scientific labour can give an enormous impulse to scientific training by showing a real preference for young men who have passed through the courses of study recommended. With this I entirely agree, and I do trust that those who are in the habit of taking pupils, apprentices and clerks, will consider it for their own benefit to give the preference, as far as possible, to those adducing evidence of the possession of adequate instruction in the sciences applicable respectively to their professions or occupations. But would it be asking too much that studentships or scholarships be founded in connexion with commercial studies as a small reward to those who, being employed all the day in arduous work, devote their leisure time, morning and evening, to the cultivation of what, in the end, will prove as advantageous to the community at large as to themselves. Would it be too much to expect that some of our merchant princes and wealthy City companies should do for commerce what Mr. Whitworth and Sir David Baxter have so nobly done for mechanics and industry?

The necessity of extending commercial education is felt in other countries as well as in this. The Paris Chamber of Commerce recently founded a School of Commerce, for imparting the special knowledge necessary for the heads of trading firms, and the French Commission on Technical Instruction recommended that the secondary special instruction should comprise both an elementary and a superior instruction in commercial science. In Germany the practical schools impart such instruction, and the Academy of Commerce at Vienna, the School of Commerce at Munich, and the commercial divisions of the Polytechnic Institutes of Munich, Stuttgart, and Baden, teach all the requirements of commerce. Italy has her commercial institutes. In Belgium the Superior Institute of Commerce, at Antwerp, is a complete commercial college; and in America there is an international chain of com-

mercial colleges in upwards of thirty of the leading commercial cities of the United States and Canada, where the attempt is made to teach both the principles and practice of commerce. We learn that in these colleges everything is done on the premises. The young aspiring merchant has his correspondents in other colleges of the chain, with whom he carries on the mimicry of real trade; he has but to step from one end of the apartment to the other to transact imaginary business with his banker. The whole mystery of letters of credit and bills of exchange is revealed to him. Stock is regularly taken; affairs are wound up in bankruptcy; commercial law is expounded; book-keeping in every form of entry is practised; and no single transaction of commerce is unrepresented, so far at least as its forms are concerned. For my part, I do not think it expedient to spend the valuable time of college-work in anything beyond the instruction in the sciences required for commerce. The practice of commerce will always be learned better in a merchant's office than in the college classes. But it is important to realise that other countries are alive to the necessity of elevating the character of the merchant, and of diffusing among both merchants and clerks those principles of science which are necessary for the efficient discharge of duties of great importance to the well-being of the country. Hitherto the British merchant has enjoyed a world-wide reputation for perspicacity, boldness, and enterprise. Well known for his wealth, he has been equally esteemed for integrity of principle and high tone of morals. Let us hope that though other nations follow him in close competition in the pursuits of trade and merchandise, he may still stand foremost in intelligence and virtue.

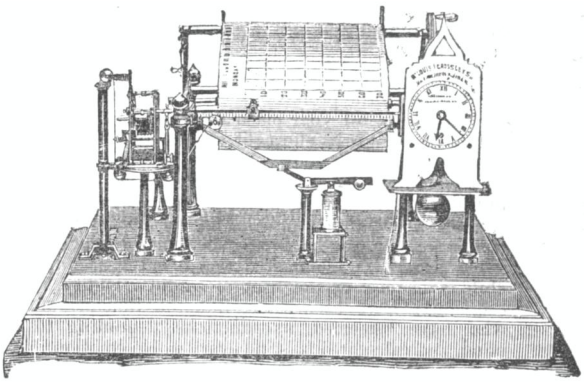
SELF-REGISTERING ELECTRICAL ANEMOMETER.

This instrument was invented by Mr. Louis J. Crossley, and is manufactured by Mr. Sax, of Bloomsbury. In the year 1865, while the inventor was studying the relative velocity of the winds on lofty hills near Halifax, the great convenience that would result from the use of electricity became very apparent. The loftiest of these hills is more than 1,000 feet above the sea, and nearly 800 feet above the valley in which the Calder runs. The other points—High-road, Wellmoor, King's-cross, and the Museum, are, respectively, 830, 660, and 511 feet above the sea. All these lie in a line, running from W. to E. A little to the S. of this line is Willow-hall, the residence of Mr. Crossley, which is about two miles away from the most distant hill. It was proposed to connect these stations by telegraph wires, all terminating at Willow-hall; to put together a simple inexpensive instrument for recording the velocity of the wind as given by sets of Robinson's cups; and then to study the effect of elevation and position upon the great westerly gales of autumn and winter. The wires were laid to the loftiest points, and an instrument devised for sending the currents to the recording apparatus. It consists of a set of Robinson's cups attached to a tube, within which is a long spindle. At the bottom of the tube, and fixed to it, is a cog-wheel working a larger one. Upon the latter is soldered a broad inclined plane of platinum. Above these wheels is a brass bridge; to this is soldered a strip of elastic steel, having its free end armed with a broad platinum surface, so that, after a certain number of revolutions of the cups the lower plane glides under the upper, and makes contact. This arrangement has been found to answer extremely well. Another form is one in which platinum pegs, fixed to the wheel, and a lever armed with platinum, are made to send the currents. This worked for several years, but not very satisfactorily. Excellence of workmanship and strength of make would, however, remedy its defects. Certainty of contact, perfection, and considerable duration of contact, as well as great steadiness of mechanism, are the points to be attained in this part of the apparatus.

The recording instrument consists of an electro-magnet, and armature, a train of wheels, and a set of four dials. The principle is identical with that of Breguet's A B C telegraph, with the exception that the spring is dispensed with. Four of these instruments were made and placed at the four stations above-named, and found to work well. The recording apparatus cost from £4 to £5; the cup apparatus about £4; the battery of twelve Daniell's cells, about £1 10s.—so that, for £10, the instrument could be obtained complete. The battery only needs the supply of a little sulphate of copper once in two or three months. The cup apparatus, if well made, would last many years. Cups of various sizes have been tried; some were three, some were six, and some were ten inches in diameter. Those now in use are nine inches, and the length of the arms, measuring from the centres of the cups, is forty-seven inches.

Of course this instrument must be read at some fixed hour daily. The readings being in currents, can be readily reduced to miles of wind by a simple division, or by reference to a table drawn up for each instrument. The recording instrument is contained in a mahogany box, 6in. long, 6in. high, and 4in. broad, having a glass face.

FIG. 1.



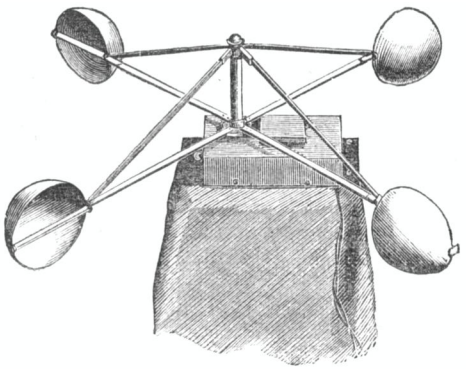
In Fig. 1 is shown the self-recording anemometer. On the left is seen clockwork, with an electro-magnet under it; the armature of this magnet is carried up to the teeth of the escape wheel, and allows only one cog to escape at a time; the axis of this wheel is prolonged in the form of a screw, 18 inches in length, so that as the cogs escape the screw revolves. Upon the screw is placed a carriage with a pencil, so arranged that the lower part of the carriage slides along a brass railway, to which it is loosely attached. In front of the long screw is a paper drum, which is driven by the clock on the right. Behind the drum are two brass rollers or bobbins; from the lower one the paper is drawn by the revolving drum at the rate of one inch per hour; and after passing over the drum, and receiving the wind curve from the pencil, it is drawn round the upper bobbin, by means of a weight. The paper is ruled for miles of wind, and also for the hours of the day, and along the zero line, on the left, are printed in large type the hours and days. A sheet may thus be put on every morning (which is in every respect the best plan), or a month's paper may be rolled upon the lower bobbin at once.

The pencil can be made to return to the zero line, either every hour, or when it has crossed the paper. This is done by means of the driving clock, and an electro-magnet under the railway. The armature of this magnet is attached to a lever, the long arm coming in contact with the magnet, and the short arm raising the railway and the carriage. Contact is made in the driving-clock every hour, and a current thus sent into the magnet; the lever is drawn down, the carriage lifted

from the screw, and pulled back along the rails by a cord and weight. The weight passes down a brass tube, and when it reaches the bottom it strikes down a spring; the current is thus thrown out of the electro-magnet, and the carriage falls upon the screw and begins its work again. All this is done in less than one second of time.

Fig. 2 shows the arrangement of the cups.

Fig. 2.



The advantages claimed for this instrument, when reduced in size (and this is now being done), are:—1. Its cost will be small. 2. It is easily fixed, and easily removed. 3. The cups may be fixed at any distance from the recording instrument. 4. The cups may be fixed upon any chimney of an ordinary house, without having to drill holes in the roof for the passage of rods, chains, &c. 5. The recording instrument, when reduced in size, will stand in a glass case 1ft. square.

As regards trouble in attending to the machine, the driving-clock needs winding up weekly, the escapement clock every two days; the weight, every day or week, according to the depth of the fall; the battery must be looked at, and a little sulphate added, every two or three months.

Fine Arts.

Government Patronage of Art.—The *Daily Telegraph* says:—"Sir James Thornhill, we are told, contracted to paint the interior of the cupola of St. Paul's Cathedral at the rate of forty shillings the Flemish ell. But there are a great many yards in the area of the dome of St. Paul's; and Sir James, it is said, did not make a very bad bargain. Somewhat better terms were offered him for decorating the Hall at Greenwich Hospital; but, in the execution of both works, there were many 'bits of fat,' as actors say. Plenty of clouds, plenty of sky, plenty of voluminous draperies, flying, like the winds in Sternhold and Hopkins, 'all abroad'—these enabled the painter of allegories to get over a large space of canvas in a comparatively short time. Our Paris correspondent told us yesterday of an able French painter, M. Bénédict Masson, who does not appear to have been so fortunate as Sir James Thornhill. He contracted to paint, with episodes from French military history, the Cour d'Honneur at the Hôtel des Invalides. The task was gigantic; for each side of the court measures about a hundred and fifty feet. The Emperor came to see the work while it was in progress, and asked how much the Ministry of Fine Arts paid for each of these colossal paintings. M. Masson replied that he was only to receive twelve thousand francs—four hundred and eighty pounds. His Majesty was shocked, and promised to have the affair inquired into; but the Fine Arts Minister has not fulfilled the Imperial promise. The poor artist declares that he is two thousand pounds out of pocket, and is on the verge of ruin. Now, an English painter of M. Masson's standing would, for a single fresco or other painting, of very moderate dimensions, on the walls of the new Palace at Westminster, receive, certainly a thousand, perhaps two thousand pounds sterling; and yet English artists sometimes complain that they lose money by undertaking Government work. M. Bénédict Masson's case seems to be hard; but—and there is a very important 'but' in the matter—it must be remembered that, in France, Governmental commissions to painters, although with no splendid remuneration, are continuous and continual. The Ministry of Fine Arts is an inexhaustible milch cow to artists even of average ability. In England it is only the princes of the profession whom her Majesty's Commission deigns to honour, and sometimes to squabble with; and Government patronage altogether is as rare as a blue diamond."

M. Taine on Landscape Painters.—M. Taine, in one of his recent lectures at the Ecole des Beaux Arts, Paris, made the following remarks on landscape painters:—"It may be remarked that the artists of the Latin race always paint classical landscapes, and show little taste for wild natural scenery. They have only the tastes of society. A glance at our ancestors the Gauls will show the difference between them and the Dutch; the former lived in villages placed near each other, loved companionship, and sought the pleasures of society and conversation. The Germans did not congregate together; each placed himself near a stream of water, and lived in isolation, except as regarded the affairs of the tribe. It is still the same in England, where everyone desires to have a house to himself, in a little enclosure, which shuts it out from its neighbours, instead of taking up his quarters in a large house, as with us. We like the civilized landscape, the landscape of Italian villas, or the gardens of Louis XIV., where the Grand Seigneur lives surrounded by poets, painters, architects, beautiful women, given up to the pleasures of intellect and taste. The Germanic races exhibit a contrary character. They are the men who still go to America, isolate themselves, cultivate virgin lands in far-off countries, who can do without conversation, and enjoy full liberty in the midst of nature. From these very distinctive characteristics of the two nations, as regards their manner of looking at nature and at landscape, it has resulted that Caracci, Albani, the greatest Italians, as well as Poussin and Claude Lorrain, only seek beautiful decoration, and arrange nature so as to make it look like a creation of man; the Dutch painters, on the contrary, follow real nature; they love her for herself, such as she is, and not accommodated to our convenience and to our taste. The landscape painters of this school are very numerous; after the precursors—Esaïas Van de Velde, the uncle of the celebrated Guillaume Van de Velde, Van Goyen, Pierre Molyn—there were Jean Wynants, Albert Cuyp, Van der Meer, Hobbema, the two Van de Velde, Ruysdael, Paul Potter, and how many more. All these painters, born at the epoch when Holland, after a struggle of thirty-seven years' duration, had conquered its independence, each of them had his own originality, his characteristic trait, and in the infinite diversity of the sky, earth, and water, of night and of day, found a distinct field for his talent."

Ghent Triennial Exhibition of Works of Art.—The exhibition organised by the Royal Society for the Encouragement of the Fine Arts takes place in this town once in three years only, but it is an international exhibition, and of considerable importance; it contains this year considerably more than a thousand works of art, German, Dutch, French, and Belgian, and the catalogue contains a large number of well-known names. The Belgian exhibitions are so arranged that those of the principal towns interchange with each other, and thus they obtain an importance which they could not well otherwise have.

Bordeaux Exhibition of Fine Art.—The Société des Amis des Arts, of Bordeaux, has just published the annual account of its exhibition and its results, by which it appears that while the works purchased by

private persons only amounted last year to £1,293, a sum equal to the average of former purchases, they have this year reached more than double that amount, or £2,673, a remarkable increase. The number of members of the society is increasing, and at present exceeds one thousand; but circumstances have increased the expenses in a still greater ratio, and brought them up to £459, so that the society itself was unable to make any important purchases. The authorities of the town of Bordeaux purchased for their public gallery a picture of "The Trial of Joan of Arc," by Antony Serres, a native of Bordeaux; "Sinbad the Sailor," an important work by M. Adrien Dauzats; and three water-colour drawings by M. Bernède. The general result is the sale of 187 works of art, making an amount equal to £3,573. This is a fair contribution from a provincial town towards art, and Bordeaux does not stand in the first rank in this respect. The society has held seventeen annual exhibitions, and the total sales to the present time amount to £32,876, or nearly two thousand per annum on the average. It must be noted that this result is the work of a private society, with some assistance from the local authorities, the patronage of the Emperor, and of the Minister of the Beaux Arts.

French Drawing Schools.—M. Baltard, the Director of the Architectural Works of the City of Paris, in addressing a meeting for the distribution of prizes to the pupils of the municipal drawing schools, gave the following statistical information concerning these schools:—They are open gratis to all. The number of pupils now in the schools, including those who are merely learning the elements of design, as well as those who are preparing for a professional career, is 10,800—in 1862, they numbered 1,300. The amount included in the city budget this year for drawing is equal to £12,800—in 1862, it was only £2,720. The number of schools in which drawing is taught is now 223, while in 1862 there were but 133 in existence. Moreover, the solicitude of the authorities and the progress made are elsewhere apparent, the primary schools for girls and boys, together with the adult classes, have been increased during the past six years from 303 to 418. It is not only in Paris, added M. Baltard, that institutions for professional education and its principal element, artistic and geometric drawing, have been founded and developed—there are already industrial schools at Châlons, Aix, and Angers. The school at Cluny, so recently created by the Minister of Public Instruction, already takes its place amongst the most important establishments for special instruction in existence, one of the most useful auxiliaries in the development of youthful intelligence and ability.

Manufactures.

Tooth's System of Boiling Sugar.—The *Produce Markets Review* says:—"In an ordinary vacuum pan, the top of the liquid alone forms the evaporating surface, and evaporation would, of course, be more rapid were a greater portion of the liquid exposed. The most notable feature of Mr. Tooth's invention consists in pumping the juice down from the top of the vacuum pan, at the moment of granulation, through a rose. The juice is thus distributed in small streams through the air contained in the evaporating vacuum chamber, and the surface exposed, as compared with the old system, is said to be as 1,000 to 50. The evaporating chamber differs from the old vacuum pans in shape, being, to speak roughly, a long cylinder, with the ordinary round pan at the top and bottom. The juice, before reaching the evaporating chamber, is pumped up through a number of pipes surrounded by steam in a cylinder. The following advantages are stated by the inventor to be secured by this process:—1. The juice is protected from excessive and long-continued heat. 2. Long exposure to the injurious influence of the atmosphere is avoided. 3. Great rapidity in carrying on the evaporation is secured. 4. The juice is transferred to the vacuum pan (or evaporating chamber) immediately after defecation and filtration, avoiding the necessity of open pans. 5. Any extent of heating and evaporating surface is easily obtained. 6. The cost of fuel is greatly lessened. 7. Vacuum pans now in use may be made available for the improved system at a comparatively small cost. 8. The finest sugar is produced without the expense of animal charcoal, and the crystallisation being perfect there is no loss by drainage. 9. There is no formation of molasses beyond that naturally existing in the juice, as the temperature never need exceed 140° to 160° Fahrenheit. 10. The system is also useful in beetroot sugar manufactories. There is an arrangement by which the clogging of the rose, through which the partly granulated sugar passes, is remedied. The idea of exposing a greater surface to evaporation seems to us excellent in theory, but it belongs, of course, to practical men to say if it will work. Mr. Tooth has another patent to compete with Mr. Fryer's concretor, for rapid and cheap evaporation. This consists in passing the partially granulated juice through a rose, and letting it drop down through a long cylinder or tower filled with heated air. The patentee states that the juice reaches the bottom in the shape of sugar."

Commerce.

The Vintage in France.—The produce of the whole of the vineyards of France this year is estimated at between 50 and 60 millions of hectolitres, that is to say, from 1,100 to 1,320 millions of English gallons. The official returns give the production of preceding years as follows:—

1865	68,393,000	hectolitres.
1866	63,838,000	,,
1867	55,000,000	,,

The amount of land planted with vines is 6,750,000 acres, or 24,000 square kilometres, the whole superficial area of France, or of the cultivated lands, being 543,051 square kilometres, so that the vine, important as it is in French agriculture, does not occupy one-twenty-second part of the land. Of the fifty-five millions of hectolitres of wine produced in 1867, rather more than half was consumed in the country in the natural form; seven millions of hectolitres were converted into spirits, and 335,306 hectolitres into vinegar. The quantity consumed by the growers themselves is given as averaging only four millions of hectolitres during the past five years, but it is said to have reached an average of twelve millions during the period of five years ending with 1862. This extraordinary difference must be attributed, not to a diminution in the wine drunk at home in the wine districts, but to a falling off in the production of spirits from wine, which is greater every year. Dividing the 28½ millions of hectolitres consumed in France last year by the number of the whole population, we obtain an average result per head of about sixteen gallons per annum; and to this must be added a large quantity of spirits and beer; but it must be remembered that by far the greatest part of this wine is taken with meals, and in moderate quantities at a time.

Russian Commerce.—The official returns for the first six months of the present year show a serious diminution in the receipts of the Russian custom-house, the deficit approaching two millions of roubles, as compared with the amount received during the same period last year, namely 24½ millions. The largest falling-off in the import list is in raw sugar, the quantity imported this year being under 50,000 pouds, against more than 300,000 pouds last year; refined sugar and coffee also show each a small diminution; salt, a very

considerable one, amounting to more than 20 per cent.; textile materials and fabrics mostly show a large falling-off; raw cotton to the extent of 10 per cent.; cotton yarns about 12 per cent.; silk, nearly 40 per cent.; cottons, about 25 per cent.; linens, 20 per cent.; and silks and woollens a slight diminution; raw wool, on the contrary, shows an increase of more than 10 per cent. The articles which exhibit an increase, as compared with last year, are, tea, about 8 per cent.; wine, a large per centage; tobacco and cigars, dyewoods and lead, to the extent of nearly 50 per cent. The exports exhibit a diminution in cereals to the extent of nearly one-seventh; tallow, one-fourth; raw hemp, a tenth; and yarns of hemp and flax, a small falling-off. On the other hand there has been an increase in linseed and hempseed to the extent of nearly one-half; in flax, of rather more; tow, more than double; skins nearly the same; leather, an increase of more than three hundred per cent.; bones about a third; wool, still larger; bristles and potash nearly double; iron, 50 per cent; cables and cordage, a small increase; sailcloth, duck, and brabante, nearly double; other coarse linen cloths, a still larger augmentation; timber a considerable increase; and furs nearly three times the amount of last year. The returns for the various countries are not given. The imports of the precious metals stand at nineteen millions of roubles against a little more than two millions during the same period last year, while the exports, on the contrary, have been less than three millions against nearly ten millions.

The Silk Trade at Marseilles.—The following statistics relating to imports of silk cocoons and grains (eggs) at Marseilles during 1867 have recently been published in the annual returns of the Chamber of Commerce of that city. The imports of silk during the last six years were:—

	No. of bales.
1862	19,693
1863	24,502
1864	23,888
1865	39,542
1866	29,491
1867	32,000

This decrease in the imports of bales of silk since 1865 may, in some measure, be attributed to the falling off in the supplies from the Levant, Persia, and the Caucasus, in which countries the silkworm disease has been prevalent. The imports from these places, which in 1864 were 12,990 bales, fell 8,867 in 1865; 6,663 in 1866; and in 1867 to only 4,663. Only 1,900 bales were obtained from Persia and the Caucasus last year against 4,500 in 1866. The imports from China and Japan, on the other hand, have greatly increased, and during the last five years those from the former country have been nearly doubled, whilst those from the latter have been increased threefold. The following are the imports from China and Japan during the last five years:—

	China.	Japan.	Total.
	Bales.	Bales.	Bales.
1863	11,051	2,871	13,922
1864	6,894	2,917	9,811
1865	19,031	8,103	27,134
1866	11,501	5,222	16,722
1867	20,540	8,290	28,830

The imports of cocoons were as follows:—

	Kilogrammes.
1862	728,900
1863	743,400
1864	542,000
1865	664,000
1866	745,000
1867	579,000

This decrease in the importation of cocoons may be attributed also to the falling off in the supply from the Caucasus, which in 1866 was 300,000 kils., and in 1867 did not exceed 8,000 kils. The supply of grains, which, in 1863, amounted to from 38,000 to 40,000 kils., was formerly obtained almost exclusively from Nouka, the Caucasus, and Georgia, has, since 1865, been obtained principally from Japan. The number of cards of grain (each card contains, on the average, 25 grammes of grain) imported from Yokohama and Nagasaki, in 1865, amounted to 2,000,000, or about 50,000 kils., from which must be deducted from 10 to 12 per cent. for damaged grain. In consequence of the great quantity which were brought into the market in 1865, the prices fell from 18frs. per card to from 2frs. to 3frs., and even as low as 1fr. 50c.; and upwards of 300,000 cards remain unsold. In 1866 and 1867 the number of cards imported into Europe was only 800,000, of which two-thirds were sent to Italy, and one-third remained in France.

Consumption of Wine.—The following table (quoted from the *Produce Markets Review*) shows the average consumption in this country in 1856-59 (previously to the reduced duty), together with those of 1867 and the present year, which last is calculated on the basis of the first seven months, showing the relative positions of French and Spanish wines in our consumption:—

Wines.	Average of Years.	Gallons consumed.	Per-centage of Total.	Total Gallons.
Spanish	1856 to 1859	2,785,831	39·58	7,092,046
Do.	1867	5,862,630	42·62	13,754,343
Estimate from the first seven months	1868	6,167,067	40·59	15,192,375
Portuguese	1856 to 1859	2,201,305	30·99	7,092,046
Do.	1867	2,857,399	20·77	13,754,343
Estimate from the first seven months	1868	2,721,577	17·91	15,192,375
French	1856 to 1859	600,932	8·85	7,092,046
Do.	1867	3,595,177	26·13	13,754,043
Estimate from the first seven months	1868	4,666,202	30·72	15,192,375

Colonies.

Cotton at the Cape of Good Hope.—A sample of wild cotton from the district of Oudtshoorn has been on view at Cape Town. It is the produce of only two pods, is of fine quality, and pure colour, and literally as "fine as silk." This wild cotton grows in abundance, not only in Oudtshoorn, but in many other divisions of the colony—in Albany and Queen's Town, for instance; there is, therefore, every reason to suppose the cotton plant might be most successfully cultivated in South Africa.

Resources of New South Wales.—The *Sydney Morning Herald* says:—"This colony never held out greater attractions than it does now. In three different directions the railways have tapped large areas of good agricultural land, where farmers will always be within easy reach of a market. The agriculturist can please himself as to the choice of climate and crop. No other colony probably offers such variety. From the English climate

on the highest lands, down to the semi-tropical climate on the northern rivers, there are all intermediate grades. The coast lands have been proved to be well fitted for the production of sugar. The preliminary difficulties have been overcome; and, though on a small scale as yet, local-grown sugar has come into the market. So encouraging are the prospects of this new industry, that speculative capitalists are beginning to take it up, and it promises in a very few years to be the most attractive of our agricultural industries. But besides sugar, cotton will grow excellently, if the requisite pains are taken with it, and one or two enterprising innovators have shown that nothing but the right effort is wanted to to make this a great silk-producing country."

Corn and Wine in Victoria.—The average yield of wheat in South Australia was only about five bushels to the acre, while in this colony (Victoria) the yield was fifteen bushels against twenty-two bushels per acre the year before. The actual decrease in the total yield of wheat was 1,151,312 bushels. The total area under wheat was 220,734 acres, producing 3,489,893 bushels. The area under oats was 124,558 acres, producing 2,350,110 bushels. The vineyards extended to 4,176 acres, containing 8,341,497 vines, which yielded the vintage before this 27,641 cwt. of grapes not made into wine, and 101,327 so disposed of; the quantity of wine being 361,790 gallons. Altogether there were in cultivation last year 634,270 acres, which is nearly an acre per head on the population.

The Census of New Zealand for 1867 states the number of houses or dwellings in New Zealand at 54,009 against 37,996 in 1864. Of these, 38,840 were wooden, 1,182 brick and stone, 13,119 other materials, and 868 raupo. Besides these there were 6,559 buildings uninhabited, or used only as stores or offices. The number of houses building when the census was made was 697 in the several provinces—Auckland, 112; Wellington, 86; Canterbury, 216; Otago, 111; Nelson, 66; Taranaki, 31; Hawkes Bay, 30; Marlborough, 19; Southland, 25. The total population in December, 1867, was 218,637.

Manufactures of New South Wales.—The total number of manufacturers' works, &c., in this colony is 2,389, 159 of which are mills for grinding and dressing grain. There are 5 manufactories for the manufacture of woollens, producing 172,720 yards cloth; 26 soap manufactories, producing 68,456 cwts.; 37 of tobacco, producing 7,755 cwts.; 2 of refined sugar, producing 110,509 cwts.; and 45 boiling down establishments, producing 19,416 cwts. tallow, and 6,284 lbs. of lard.

Glass Manufactory in Melbourne.—A glass manufactory is shortly to be started in Melbourne. The colonial manufacture of glass has hitherto been very small. Many years ago there was a manufactory in Sydney, but it was abandoned. Lately it has been re-established, and although unable to compete in the ordinary forms of glassware with the home manufactories, it was found that there were many articles, such as glass fish globes, confectioners' glasses, carboys, soda-water bottles, &c., the importation of which is attended with the colonies. The resources at the command of the so much expense, which could be profitably made in manufacturer at the commencement of operations will enable him to melt and convert into glass 350 lbs. of "metal," as it is technically termed, twice a week, but if the enterprise meet with support this quantity can be doubled.

Notes.

Supply of Iced Water to Paris.—Every one who has visited the cafés of Paris, must have observed the *carafes frappées*, that is to say, water bottles with a great block of ice, often very curiously crystallised inside. The production of these frozen decanters has become a very important operation, which is carried on at ice houses situated in the Boulevard Lannes, on the Passy side of the Bois de Boulogne. The establishment consists of ten great underground ice vaults, protected from the action of the sun by buildings raised over them, and covered with straw. Each of the ice vaults is nearly five hundred feet long, and about thirty-six feet high, and the ten are capable of holding ten thousand tons of ice. The department in which the water bottles are frozen is a curiosity. These decanters are two-thirds filled with filtered water in the receptacles of the freezing machine, and the freezing is produced by means of salt water and vaporised ether. A steam engine of sixteen horse-power is employed to work two air-pumps, which produce the vacuum in the copper reservoirs placed in the salt-water basins. After a short time, the water within the decanters is reduced below freezing point, and yet it is not frozen. Each bottle is then taken in hand by a workman and its contents rapidly stirred with a stick, and the freezing takes place as if by magic. More than six thousand of these frozen carafes are sent out daily in hot weather at a very trifling charge, and each being filled up with fresh water as often as required, will serve during a long summer day and cool ten gallons of water, so that the Parisians are supplied by this establishment with about sixty thousand gallons of iced water per day. The economy of this system, as compared with the use of pure broken ice, half of which is wasted, is very evident; and, besides, the ice in the frozen carafes is produced from pure filtered water. Why should not London and other large towns have their frozen water bottles as well as Paris?

Decimal Coinage in Italy.—The value of the money coined in Italy from September, 1862, to 30th June, 1868, was as follows:—

	frs.	cents.
Gold coin	200,132,000	0
Silver do	165,062,825	0
Bronze	65,573,980	14
Total frs.	430,768,805	14

The following is the value of the old coinage of the various Italian States withdrawn from circulation during the same period:—

	frs.	cents.
Piedmont and Sardinia ..	27,607,014	84
Lombardy	4,722,227	95
Parma	1,247,234	48
Modena	524,762	66
Rome and Bologna	54,842,071	79
Tuscany	84,123,802	37
Naples and Sicily	155,653,253	98
Venice	4,514,029	50
Foreign coin	16,124,436	55
Total	349,358,834	12

Railway Orchards.—A proposition is now before the French railway companies to plant the slopes of the railways with fruit trees. The plan suggested is to support the trees, pear, gooseberry, &c., according to soil and position, on light iron espaliers. The cost of cultivation is estimated at less than sixpence a yard. The idea is not quite new, for in certain parts of Germany and in the Grand Duchy of Luxembourg the lines are bordered with fruit trees. Nothing is to be said against such an economical arrangement, but many travellers on the French lines will regret the lilacs, syringas, and other shrubs and flowers which now flourish there in many places.

French Revenue Accounts.—The Minister of Finance has published the accounts of income for the first nine months of the present year, as compared with 1866 and 1867. The revenue from indirect taxation has amounted this year to the sum of £37,195,200; in 1866 it amounted to £36,485,200, leaving a balance in favour of 1868 of £710,000, but certain diminutions which have taken place in the extra tax on registration, import duties, &c., bring up the real augmentation to £1,100,000. Compared with last year, the increase is equal to £439,360, but 1868 being leap-year, this sum is actually reduced

to £317,160. The items in which the great differences appear, are:—In augmentation, registration, mortgage, and other fees, import duties, taxes on potable liquors, and on the home-made sugar, and postage, and in diminution duties on French colonial sugar, on foreign sugar and salt, and on the sale of tobacco, snuff, &c. The whole of the improvements, however, belong to the first and second quarters of the year, for the third quarter of 1868 shows a deficit amounting to £183,800, as compared with the same quarter of last year.

The Electric Light.—The *Athenæum* says, "M. Haussmann's irrepressible energy, directed to the reconstruction of Paris, has recently assumed a new phase. Daylight being insufficient to enable certain works to be completed in the desired time, the aid of M. Serrin's beautiful and ingenious apparatus for the automatic regulation of the carbon electrodes of electric lamps has been called into requisition. The intense nature of this light is such that it has been used with great success in obtaining photographs of the catacombs under Paris, and also of the sewers, and it is now employed to enable masons and other workmen to labour through the night hours."

Patents.

From Commissioners of Patents' Journal, October 23.

Grants of Provisional Protection.

Acid liquors, utilising waste—3119—N. Smith.
Animal skins, tanning—3141—L. Clozel.
Bale ties—2974—T. Briggs.
Barometers, &c.—2924—A. Barclay.
Bath-rooms, &c., supplying with hot water—2888—F. Dyer.
Boots, &c., application of elastic fillets, &c., to—2920—J. Macintosh and W. Boggett.
Boots, &c., button-holes for—2926—J. H. Glew.
Buckles, &c.—2849—F. F. Greenwood.
Bulldog, &c., machinery for reducing—3107—B. Walker and J. F. A. Pflaum.
Candlesticks—2992—J. Mabson.
Carriages, &c., wheels for—2936—J. Fry.
Cartridges—3068—W. Richards.
Casks, filling—3008—J. D. Scally.
Chandeliers, extension—3038—W. R. Lake.
Charcoal, animal, preparing and cooling—2970—J. Gregory.
Chimneys, smoky, preventing and curing—3097—T. W. Dyer.
Coal, &c., getting—3145—J. G. Jones.
Compass deviations, correcting and preventing—2986—H. J. and J. W. Girdlestone.
Cooking apparatus, &c.—3054—F. P. Warren.
Cotton, &c., flyers used in spinning—3058—J. H. Johnson.
Door knobs—3089—T. Heacock.
Door plates, &c.—3099—L. Hannart, N. A. Aubertin, jun., and W. J. Cunningham.
Earth closets and commodes—2972—R. Duncan.
Electricity, generating by heat—3060—E. T. Hughes.
Electro-telegraphic conductors, &c.—3129—W. A. Lyttle.
Enamel applicable to wood, &c.—3042—E. Tchepelevsky.
Explosive compounds, apparatus for firing—3115—F. A. Abel and E. O. Brown.
Fatty matters, hardening—3026—C. E. Brooman.
Fire-arms, breech-loading—3002—G. Unwin.
Fire-places, top bar for—3139—R. Rowbotham and C. Ezard.
Fuel, artificial—2962—G. F. Morant.
Fuel, &c., economising—2976—J. Wadsworth.
Furnaces, &c., used in metallic operations—3137—W. Yates.
Gas burners—2944—J. Wright and W. H. Williams.
Gas burners—2980—E. T. Hughes.
Gas regulators—3109—D. and G. Hallas and S. J. Woodhouse.
Gas regulators, &c.—3133—W. T. Sugg.
Gates and turnstiles on railway level crossings—2988—G. Daws.
Gauges for indicating the pressure of steam, &c.—2994—A. Lafargue.
Grain, decorticating—3016—W. E. Newton.
Hoisting gear, prevention of accidents from the breaking of chains or ropes of—2952—P. J. E. Caron.
Hydraulic presses—3040—E. T. Bellhouse and W. J. Dorning.
Hydraulic rams—3048—T. Garnett.
Hydrocarbon liquids, generating and burning the vapour of—3151—W. R. Lake.
Iron and steel—3034—E. A. Cowper.
Iron and steel—3050—J. G. Willans.
Iron, converting cast into wrought—2968—C. D. Abel.
Kilns for burning clay, &c.—3022—A. Monsnergue.
Leather, &c., cutting—2934—E. Death and J. Ellwood.
Locomotive engines—3012—C. B. Chardon.
Metals, purifying—2996—W. E. Newton.
Oakum, &c., picking—2971—G. A. C. Bremme.
Omnibus traffic, apparatus for facilitating—2969—W. McAdam.
Planing machinery, &c.—2946—C. Scriven and W. Holdsworth.
Railway trains, communication between passengers, &c., in—2956—J. Ramsbottom.
Railways, apparatus for the increase of safety on inclines of—2958—C. F. Whitworth, G. Pearson, and W. Smith.
Railways, permanent way of—2954—J. H. Johnson.
Ratchet and crank braces—3024—R. F. Drury and J. E. and W. G. Walker.
Rivets, &c., metallic, manufacturing—2146—E. H. Waldenstrom.
Rouge and polishing powders—3004—A. T. Becks and G. Johnson.
Sample bags or envelopes—3046—A. G. Straker.
Saws, circular—2928—W. Thomas.
Sewing machines, &c.—3000—O. W. Powers.
Sewing machines—3103—W. J. Curtis.
Ships' binnacles—3091—W. E. Newton.
Ships' bottoms, composition for protecting—2923—H. J. B. Kendall.
Ships' bottoms, removing animal and vegetable adhesions from—3030—J. Baker.
Show boards, &c.—3125—A. Field and A. W. Tuer.
Shuttles—3062—J. Wood and J. Arundale.
Smoke, consuming—3010—J. Murray and O. Harling.
Spanners—3045—F. S. Gilbert and W. G. White.
Steam pumps, &c.—3044—G. Graveley.
Stone, &c., artificial—3006—H. Highton.
Surface condensers, &c., packing for the tubes of—3056—D. Marshall.
Telegraphic cables, &c.—3051—J. Aspinall.
Tents—2904—P. E. L. W. Stockmann.
Tents, &c.—2948—G. Ritchie.
Tin-plates, converting tin-plate shearings into—2984—W. Hallam and H. J. Madge.
Tobacco jars—3135—R. Spice.
Tobacco, manufacturing—2964—H. Gibson.
Wall papers, &c.—3064—J. Watson.
Wall papers, &c.—3066—J. Watson.
Washing apparatus—2874—C. H. Hudson.
Watches, clocks, &c.—3070—H. Josephi.
Water, heating by means of steam—2930—H. Woods.
Weights, &c., raising and lowering—2978—A. M. Clark.
Wheat, &c., separating and cleaning groats of—3113—R. Tod.
White-lead—2940—I. Baggs.
White-lead—2998—J. H. Johnson.
Wool, &c., washing—2960—J. Petrie, jun.

Inventions with Complete Specifications Filed.

Elastic moulds—3155—H. A. Bonneville.
Fire-arms, breech-loading—3165—W. R. Lake.
Carriages for ordnance, &c.—3196—W. Fitch.
Safety lamps—3198—H. A. Bonneville.

From Commissioners of Patents' Journal, October 27.

Patents on which the Stamp Duty of £50 has been paid.

2698. T. Routledge, D. Bentley, and J. B. Jackson.	2766. L. Bennett.
2717. R. Biessy.	2813. A. Boi sonneau.
2756. T. R. Crampton.	2860. R. C. Mansell.
2786. H. Larkin.	2738. A. Chaplin.
2835. H. Bessemer.	2762. H. Wilde.
2838. J. B. Elkington.	2771. T. Greenwood.
2885. C. Cochrane.	2784. W. and E. Westmoreland.
3009. T. Redwood.	2902. C. W. Jones.
2726. J. Wright.	2987. W. Clark.
2759. E. Hunt.	2751. G. L. Scott.
	2767. G. W. Bacon.

Patents on which the Stamp Duty of £100 has been Paid.

2583. W. T. Weston.	2656. I. L. Pulvermacher.
2632. J. H. Johnson.	2668. W. Wharton.
2646. C. Brison and A. Chavanne.	2834. W. J. Hay.
2669. E. Chambers.	2583. W. T. Weston.

Registered Designs.

4965—Aug. 28—Apparatus for fixing the height of window and other blinds, maps, and other similar articles—J. Collings, Birmingham.
4966—Sept. 12—The universal sovereign protector—George Edward Allshorn, Clifton-house, Dalston.
4967—Sept. 18—Ale and porter tap—John Cloves, Birmingham.
4968—Sept. 18—Breeches stretcher (The Genuflexure)—John Evans, 18, Old Compton-street, Soho.
4969—Sept. 23—A card case—G. H. and J. James, 11, Newgate-street, E.C.
4970—Sept. 28—Improved folding meat safe or lantern—Geo. Burt, Birmingham.
4971—Oct. 10—Ear-ring—Edward Umfreville, 42, Frederick-street, Birmingham.
4972—Oct. 13—Salt cellar—Elkington and Co., Birmingham.
4973—Oct. 15—Expanding fish-hook—Joseph Hemming and Joseph Welch, Redditch.
4974—Oct. 27—Photo-camera lucida—W. Whiting, 29, Park-street, Camden-town; and John Checketts, 14, Elm-grove, Hammersmith.